Doc. Number:

☐ Tentative Specification
■ Preliminary Specification
☐ Approval Specification

MODEL NO.: N133BGE
SUFFIX: LA1
DPN: RYN5X

Customer: DELL

APPROVED BY **SIGNATURE**

Name / Title
Note

Please return 1 copy for your confirmation with your signature and comments.

Approved By	Checked By	Prepared By
楊竣傑 2012-03-09 07:42:34 CST	曹文彬 2012-03-02 12:31:13 CST	阮經綸 2012-03-01 19:56:51 CST

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REVISION HISTORY

Version	Date	Page	Description
1.0	Mar. 1, 2012	All	Spec Ver.1.0 was first issued.

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1. GENERAL DESCRIPTION

1.1 OVERVIEW

N133BGE-LA1 is a 13.3" (13.3" diagonal) TFT Liquid Crystal Display module with LED Backlight unit and 40 pins LVDS interface. This module supports 1366 x 768 HD mode and can display 262,144 colors. The optimum viewing angle is at 6 o'clock direction.

1.2 GENERAL SPECIFICATI0NS

Item	Specification	Unit	Note
Screen Size	13.3 diagonal		
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1366 x R.G.B. x 768	pixel	-
Pixel Pitch	0.2148 (H) x 0.2148 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	262,144	color	-
Transmissive Mode	Normally white	-	-
Surface Treatment	Anti-Glare	-	-
Luminance, White	200	Cd/m2	
Power Consumption	Total (2.95) W (Max.) @ cell (0.8) W (Max.), BL (2.15) W (Max.)		(1)

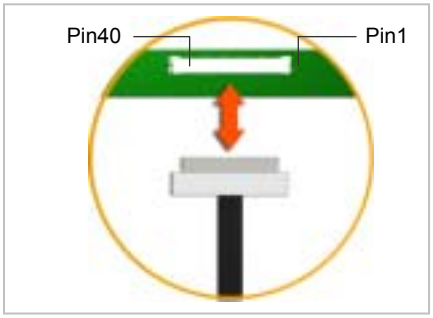
Note (1) The specified power consumption (with converter efficiency) is under the conditions at VCCS = 3.3 V, fv = 60 Hz, LED_VCCS = Typ, fPWM = 200 Hz, Duty=100% and Ta = 25 ± 2 ºC, whereas BLACK pattern is displayed.

2. MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	305.8	306.3	306.8	mm	(1)
	Vertical (V)	177.2	177.7	178.2	mm	
	Horizontal (H) with Bracket	313.6	314.1	314.6	mm	
	Vertical (V) with PCB	-	-	189.25	mm	
	Thickness (T)	-	2.85	3.05	mm	
Bezel Area	Horizontal	296.12	296.42	296.72		
	Vertical	167.77	167.97	168.17	mm	
Active Area	Horizontal	293.12	293.42	293.72	mm	
	Vertical	164.67	164.97	165.27	mm	
Weight		-	245	260	g	

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

2.1 CONNECTOR TYPE



Please refer Appendix Outline Drawing for detail design.

Connector Part No.: IPEX-20455-040E-12 or equivalent

User's connector Part No: IPEX-20453-040T-01 or equivalent

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3. ABSOLUTE MAXIMUM RATINGS

3.1 ABSOLUTE RATINGS OF ENVIRONMENT

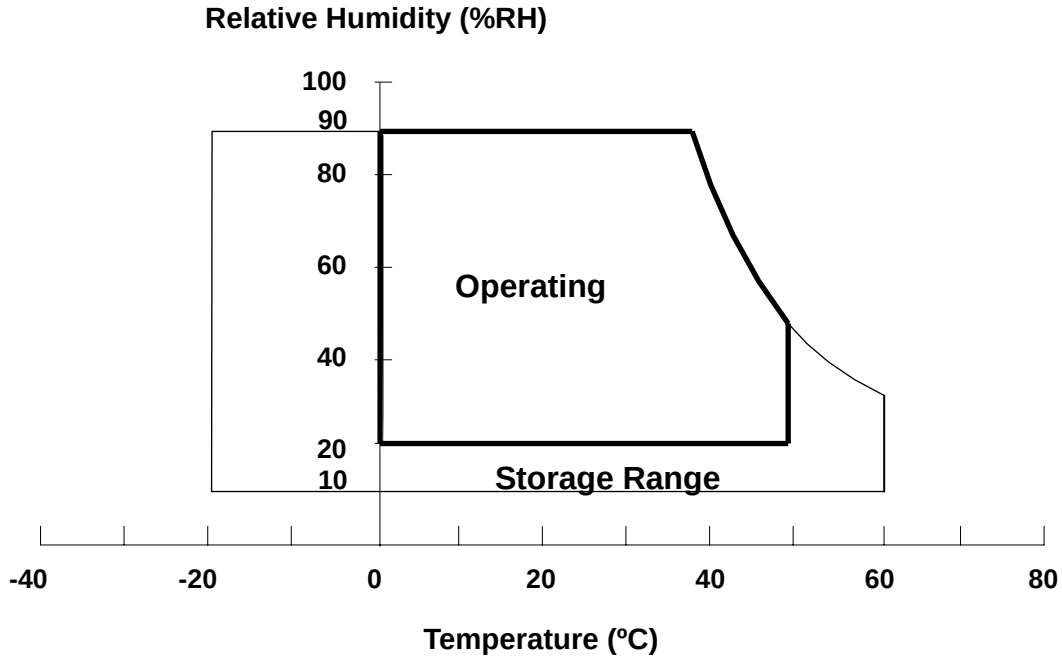
Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-20	+60	ºC	(1)
Operating Ambient Temperature	T_{OP}	0	+50	ºC	(1), (2)

Note (1) (a) 90 %RH Max. (Ta <= 40 ºC).

(b) Wet-bulb temperature should be 39 ºC Max. (Ta > 40 ºC).

(c) No condensation.

Note (2) The temperature of panel surface should be 0 ºC min. and 60 ºC max.



3.2 ELECTRICAL ABSOLUTE RATINGS

3.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	VCCS	-0.3	+4.0	V	(1)
Logic Input Voltage	V_{IN}	-0.3	VCCS+0.3	V	
Converter Input Voltage	LED_VCCS	-0.3	(25)	V	(1)
Converter Control Signal Voltage	LED_PWM,	-0.3	(5)	V	(1)
Converter Control Signal Voltage	LED_EN	-0.3	(5)	V	(1)

Note (1) Stresses beyond those listed in above “ELECTRICAL ABSOLUTE RATINGS” may cause permanent damage to the device. Normal operation should be restricted to the conditions described in “ELECTRICAL CHARACTERISTICS”..

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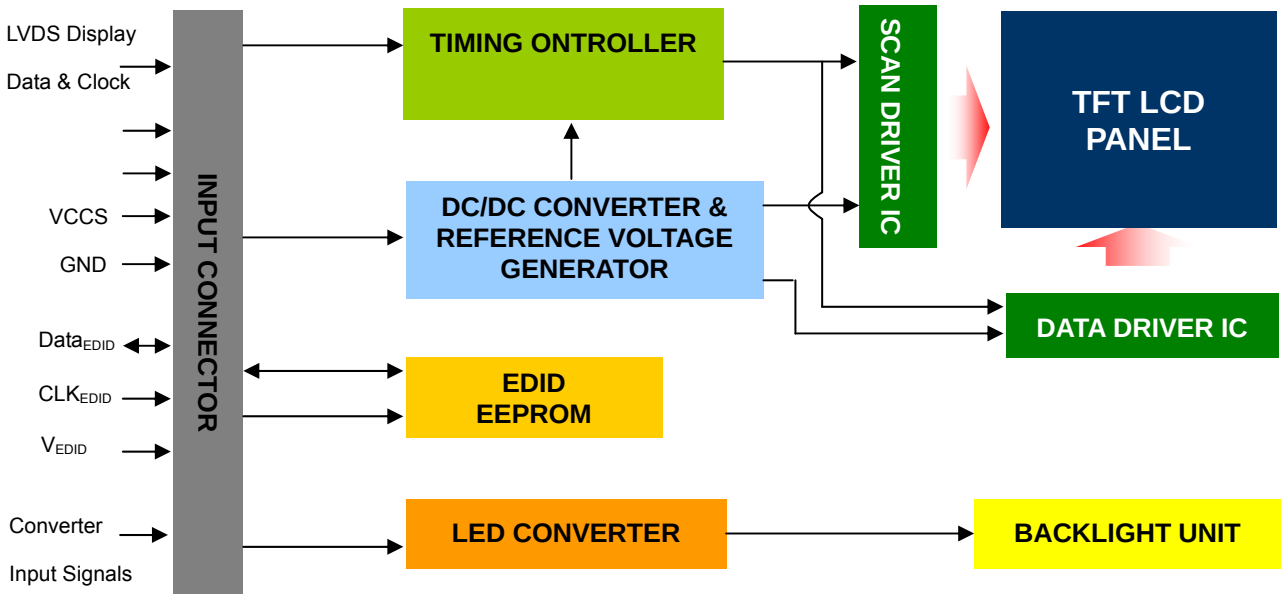
4. ELECTRICAL SPECIFICATIONS

4.1 FUNCTION BLOCK DIAGRAM



4.2. INTERFACE CONNECTIONS

PIN ASSIGNMENT

Pin	Symbol	Description	Remark
1	NC	Loop or No Connection	
2	VCCS	Power Supply (3.3V typ.)	
3	VCCS	Power Supply (3.3V typ.)	
4	VEDID	DDC 3.3V power	
5	BIST	Panel self test	
6	CLKEDID	DDC clock	
7	DATAEDID	DDC data	
8	Rxin0-	LVDS differential data input	R0-R5, G0
9	Rxin0+	LVDS differential data input	
10	VSS	Ground	
11	Rxin1-	LVDS differential data input	G1~G5, B0, B1
12	Rxin1+	LVDS differential data input	
13	VSS	Ground	
14	Rxin2-	LVDS Differential Data Input	B2-B5,HS,VS, DE
15	Rxin2+	LVDS Differential Data Input	
16	VSS	Ground	
17	RxCLK-	LVDS differential clock input	LVDS CLK
18	RxCLK+	LVDS differential clock input	
19	VSS	Ground	
20	NC	No Connection (Reserve)	
21	NC	No Connection (Reserve)	
22	VSS	Ground	
23	NC	No Connection (Reserve)	

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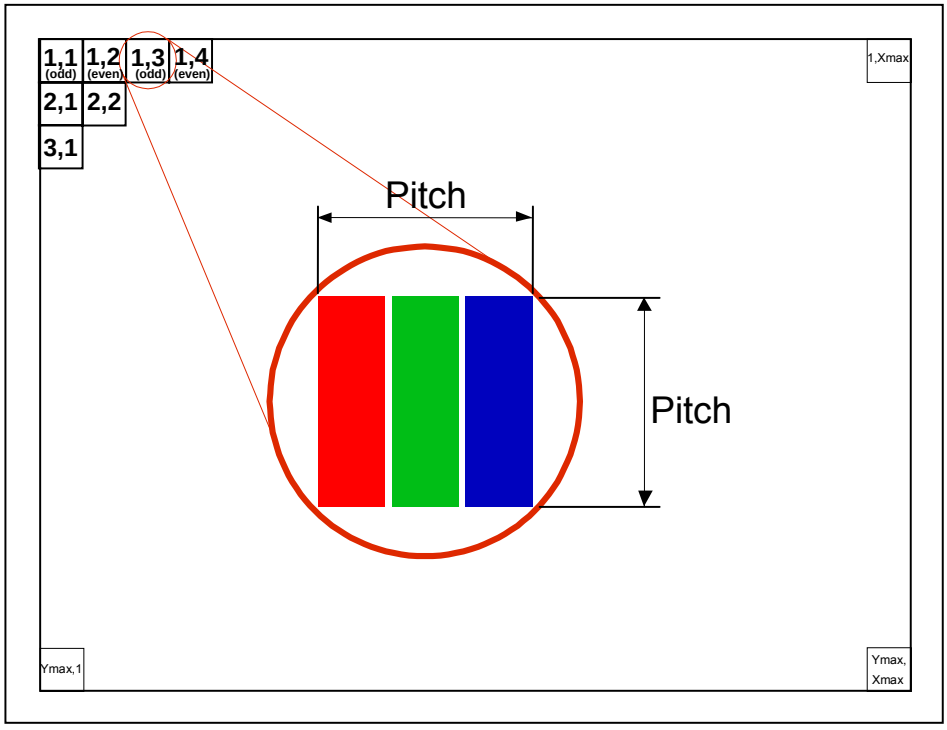
24	NC	No Connection (Reserve)	
25	VSS	Ground	
26	NC	No Connection (Reserve)	
27	NC	No Connection (Reserve)	
28	VSS	Ground	
29	NC	No Connection (Reserve)	
30	NC	No Connection (Reserve)	
31	LED_GND	LED Ground	
32	LED_GND	LED Ground	
33	LED_GND	LED Ground	
34	NC	Loop or No Connection	
35	LED_PWM	PWM Control Signal of LED Converter	
36	LED_EN	Enable Control Signal of LED Converter	
37	CABC_EN	CABC Enable Input	
38	LED_VCCS	LED Power Supply	(Support 7.5 ~ 21V)
39	LED_VCCS	LED Power Supply	(Support 7.5 ~ 21V)
40	LED_VCCS	LED Power Supply	(Support 7.5 ~ 21V)

Note (1) The first pixel is odd as shown in the following figure.



Note (2) The setting of Color engine and CABC function are as follows.

Pin	Enable	Disable
CABC_EN	Hi	Lo or Open

Hi = High level, Lo = Low level.

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4.3 ELECTRICAL CHARACTERISTICS

4.3.1 LCD ELETRONICS SPECIFICATION

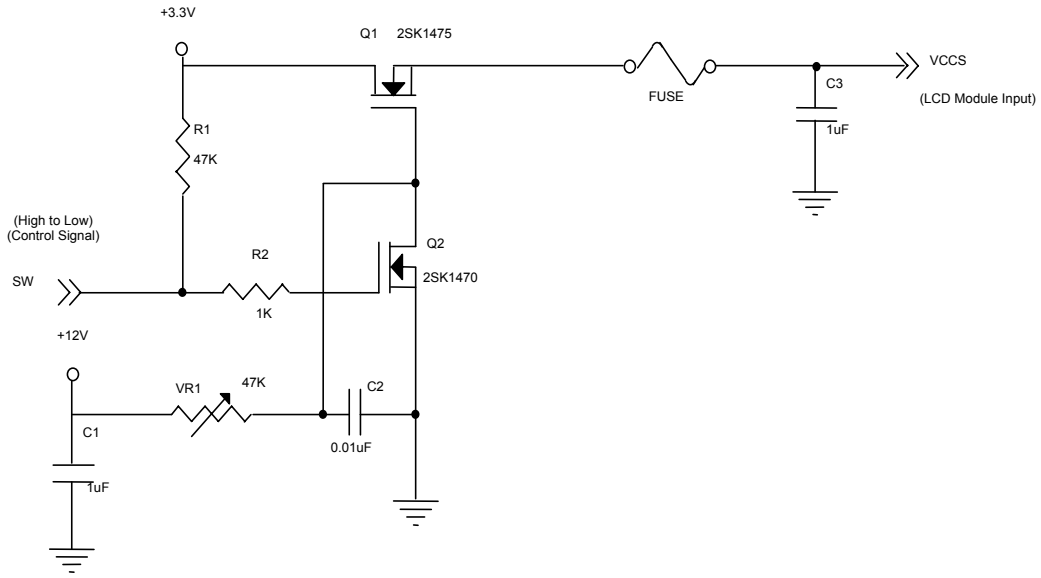
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		VCCS	3.0	3.3	3.6	V	(1)
Ripple Voltage		V_{RP}	-	50	-	mV	(1)
CABC_EN Input Voltage		V_{IHCABC}	(2.3)	-	(3.6)	V	
		V_{ILCE}	(0)	-	(0.5)	V	
Inrush Current		I_{RUSH}	-	-	1.5	A	(1),(2)
Power Supply Current	Mosaic	Icc	-	(170)	(190)	mA	(3)a
	Black		-	(200)	(230)	mA	(3)b
Power per EBL WG		P_{EBL}	-	(1.07)	-	W	(4)

Note (1) The ambient temperature is Ta = 25 ± 2 ºC.

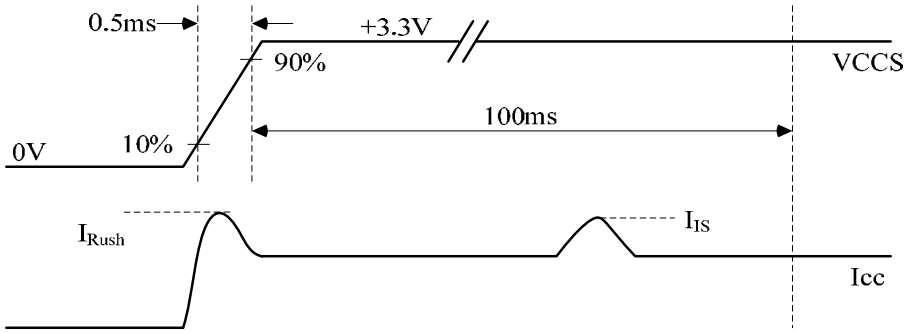
Note (2) I_{RUSH}: the maximum current when VCCS is rising

I_{IS}: the maximum current of the first 100ms after power-on

Measurement Conditions: Shown as the following figure. Test pattern: black.



VCCS rising time is 0.5ms



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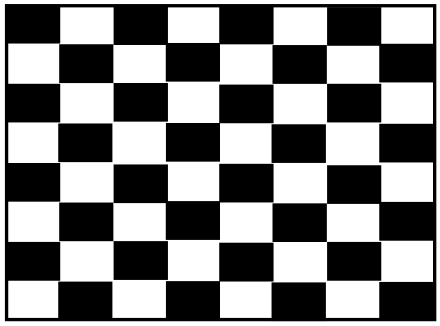
Note (3) The specified power supply current is under the conditions at VCCS = 3.3 V, Ta = 25 ± 2 ºC, DC Current and f_v = 60 Hz, whereas a power dissipation check pattern below is displayed.

a. Mosaic Pattern



Active Area

b. Black Pattern

Active Area

Note (4) The specified power are the sum of LCD panel electronics input power and the converter input power. Test conditions are as follows.

(a) VCCS = 3.3 V, Ta = 25 ± 2 ºC, f_v = 60 Hz,

(b) The pattern used is a black and white 32 x 36 checkerboard, slide #100 from the VESA file "Flat Panel Display Monitor Setup Patterns", FPDMSU.ppt.

(c) Luminance: 60 nits.

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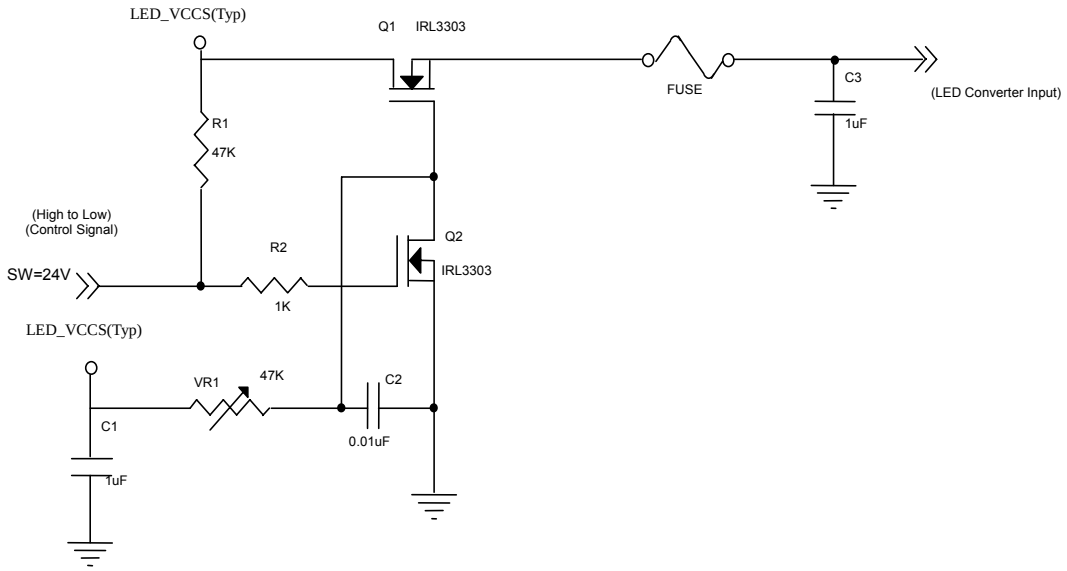
4.3.2 LED CONVERTER SPECIFICATION

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Converter Input power supply voltage		LED_Vccs	(7.5)	(12.0)	(21.0)	V	
Converter Inrush Current		$ILED_{RUSH}$	-	-	(1.5)	A	(1)
EN Control Level	Backlight On		(2.3)	-	(5.0)	V	
	Backlight Off		0	-	(0.5)	V	
PWM Control Level	PWM High Level		(2.3)	-	(5.0)	V	
	PWM Low Level		0	-	(0.5)	V	
PWM Control Duty Ratio			10	-	100	%	
			5	-	100	%	(2)
PWM Control Permissive Ripple Voltage		VPWM_pp	-	-	100	mV	
PWM Control Frequency		f_{PWM}	190	-	2K	Hz	(3)
LED Power Current	LED_VCCS =Typ.	ILED	(130)	(156)	(175)	mA	(4)

Note (1) $ILED_{RUSH}$: the maximum current when LED_VCCS is rising,

$ILED_{IS}$: the maximum current of the first 100ms after power-on,

Measurement Conditions: Shown as the following figure. LED_VCCS = Typ, Ta = 25 ± 2 ºC, f_{PWM} = 200 Hz, Duty=100%.



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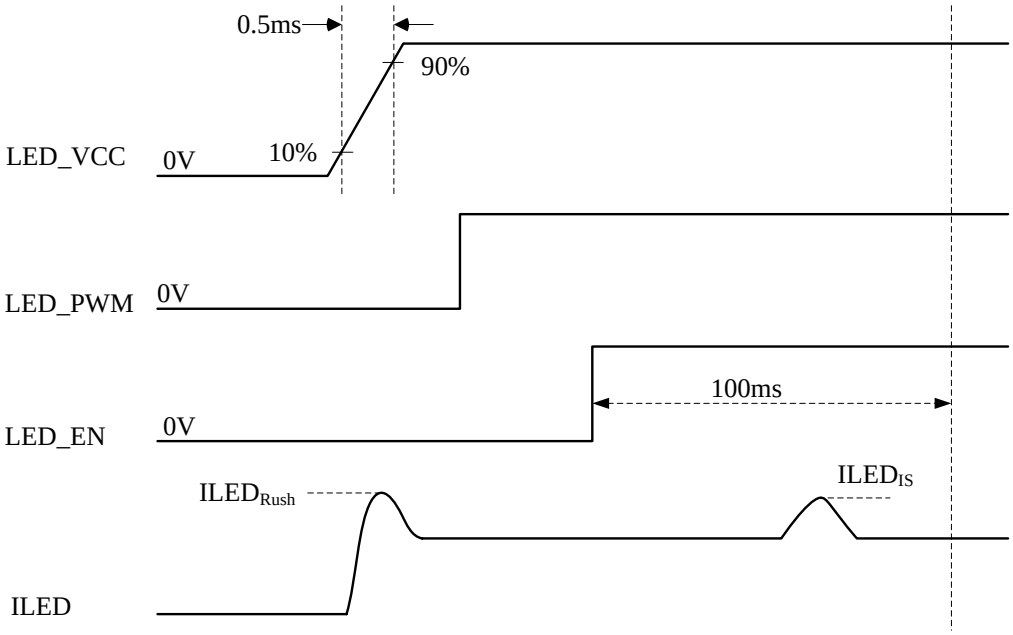
VLED rising time is 0.5ms



Note (2) If the PWM control duty ratio is less than 10%, there is some possibility that acoustic noise or backlight flash can be found. And it is also difficult to control the brightness linearity.

Note (3) If PWM control frequency is applied in the range less than 1KHz, the "waterfall" phenomenon on the screen may be found. To avoid the issue, it's a suggestion that PWM control frequency should follow the criterion as below.

PWM control frequency f_{PWM} should be in the range

$$(N + 0.33) * f \leq f_{PWM} \leq (N + 0.66) * f$$

N : Integer $(N \geq 3)$

f : Frame rate

Note (4) The specified LED power supply current is under the conditions at "LED_VCCS = Typ.", Ta = 25 ± 2 ºC, f_{PWM} = 200 Hz, Duty=100%.

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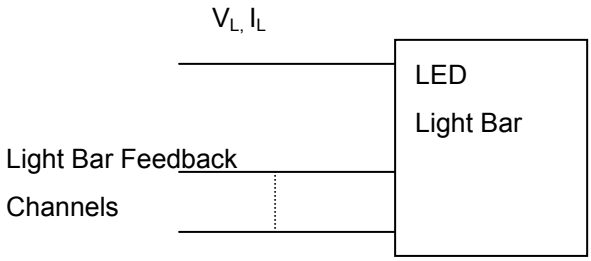
4.3.3 BACKLIGHT UNIT

Ta = 25 ± 2 ºC

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED Light Bar Power Supply Voltage	V_L	23.4	25.2	27	V	(1)(2)(Duty100%)
LED Light Bar Power Supply Current	I_L	59.85	63	66.15	mA	
Power Consumption	P_L	1.400	1.5876	1.7861	W	(3)
LED Life Time	L_{BL}	12,000	-	-	Hrs	(4)

Note (1) LED current is measured by utilizing a high frequency current meter as shown below :



Note (2) For better LED light bar driving quality, it is recommended to utilize the adaptive boost converter with current balancing function to drive LED light-bar.

Note (3) $P_L = I_L \times V_L$ (Without LED converter transfer efficiency)

Note (4) The lifetime of LED is defined as the time when it continues to operate under the conditions at Ta = 25 ±2 °C and I_L = 20 mA(Per EA) until the brightness becomes ≦ 50% of its original value.

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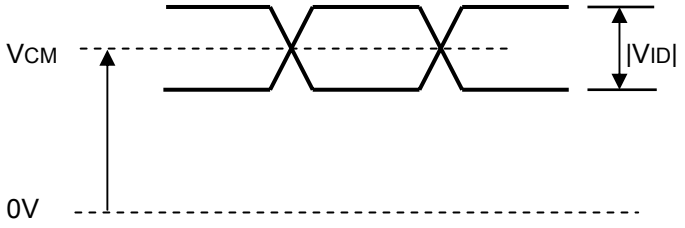
4.4 LVDS INPUT SIGNAL TIMING SPECIFICATIONS

4.4.1 LVDS DC SPECIFICATIONS

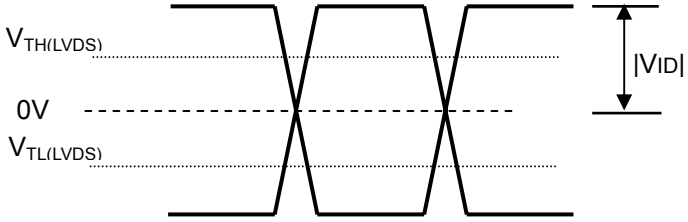
Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LVDS Differential Input High Threshold	$V_{TH(LVDS)}$	-	-	+100	mV	(1), V_{CM}=1.2V
LVDS Differential Input Low Threshold	$V_{TL(LVDS)}$	-100	-	-	mV	(1) V_{CM}=1.2V
LVDS Common Mode Voltage	V_{CM}	1.125	-	1.375	V	(1)
LVDS Differential Input Voltage	$\|V_{ID}\|$	100	-	600	mV	(1)
LVDS Terminating Resistor	R_T	-	100	-	Ohm	-

Note (1) The parameters of LVDS signals are defined as the following figures.

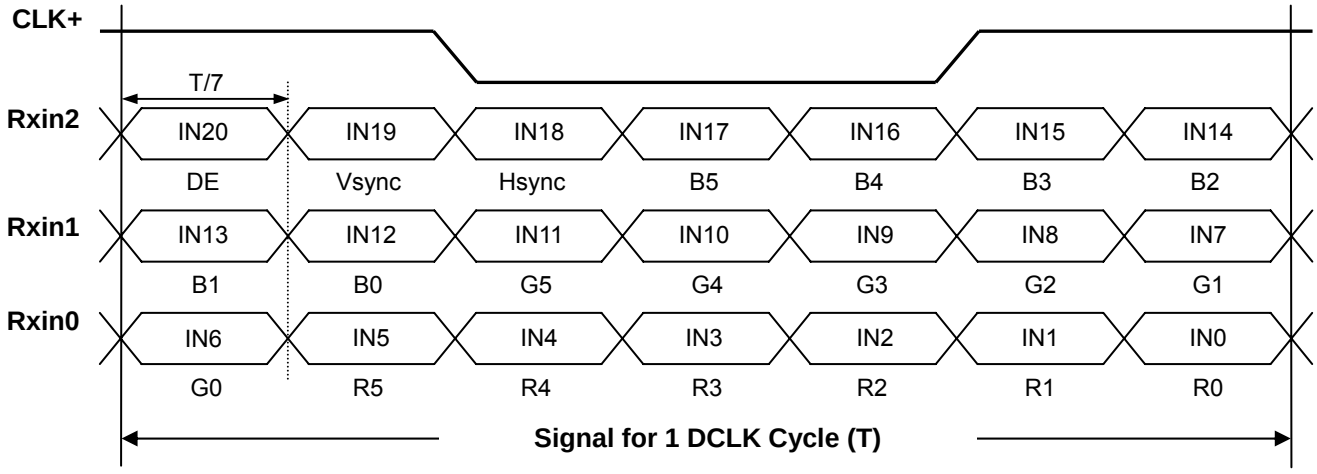
Single Ended



Differential



4.4.2 LVDS DATA FORMAT



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4.4.3 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 6-bit gray scale data input for the color. The higher the binary input the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																	
		Red						Green						Blue					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red(0)/Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0)/Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0)/Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

Note (1) 0: Low Level Voltage, 1: High Level Voltage

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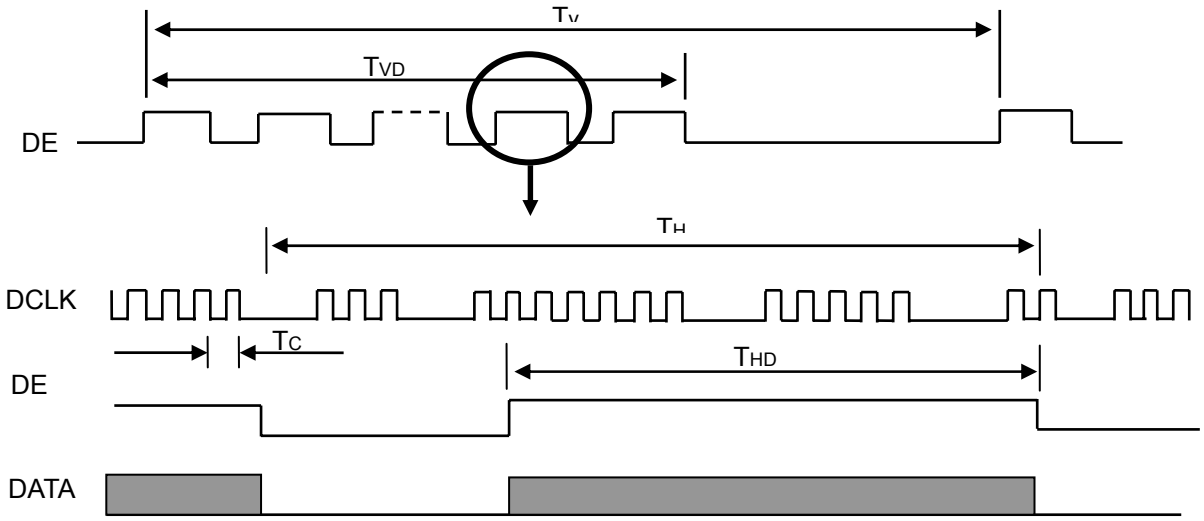
4.5 DISPLAY TIMING SPECIFICATIONS

The input signal timing specifications are shown as the following table and timing diagram.

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK	Frequency	1/Tc	(50)	(75.45)	(80)	MHz	-
DE	Vertical Total Time	TV	(778)	(806)	(1008)	TH	-
	Vertical Active Display Period	TVD	768	768	768	TH	-
	Vertical Active Blanking Period	TVB	TV-TVD	(38)	TV-TVD	TH	-
	Horizontal Total Time	TH	(1466)	(1560)	(1950)	Tc	-
	Horizontal Active Display Period	THD	1366	1366	1366	Tc	-
	Horizontal Active Blanking Period	THB	TH-THD	(194)	TH-THD	Tc	-

Note (1) Because this module is operated by DE only mode, Hsync and Vsync are ignored.

INPUT SIGNAL TIMING DIAGRAM



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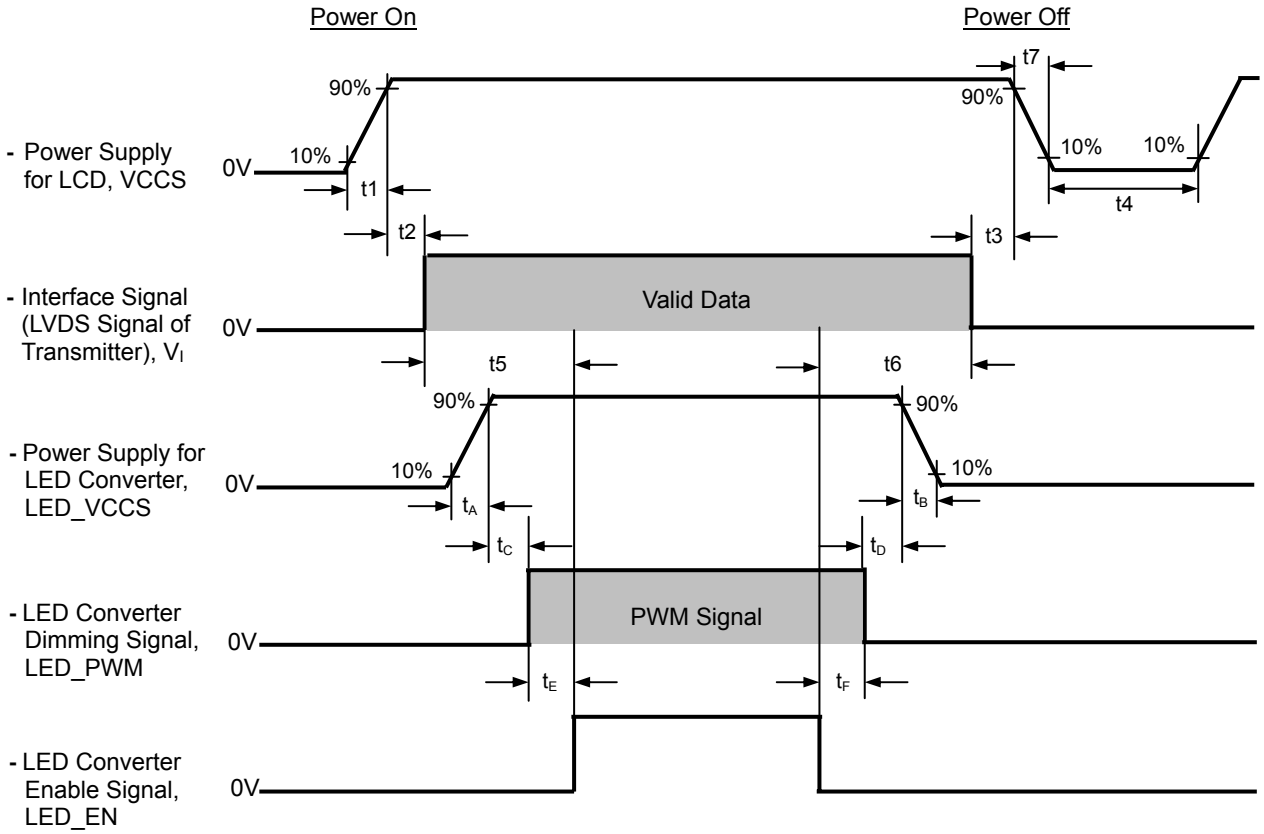
4.6 POWER ON/OFF SEQUENCE

The power sequence specifications are shown as the following table and diagram.

Symbol	Value			Unit	Note
	Min.	Typ.	Max.		
t1	(0.5)	-	(10)	ms	
t2	(0)	-	(50)	ms	
t3	(0)	-	(50)	ms	
t4	(500)	-	-	ms	
t5	(200)	-	-	ms	
t6	(200)	-	-	ms	
t7	(0.5)	-	(10)	ms	
t_A	(0.5)	-	(10)	ms	
t_B	(0)		(10)	ms	
t_C	(10)	-	-	ms	
t_D	(10)	-	-	ms	
t_E	(10)	-	-	ms	
t_F	(10)	-	-	ms	



Note (1) Please don't plug or unplug the interface cable when system is turned on.

Note (2) Please avoid floating state of the interface signal during signal invalid period.

Note (3) It is recommended that the backlight power must be turned on after the power supply for LCD and the interface signal is valid.

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5. OPTICAL CHARACTERISTICS

5.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V_{CC}	3.3	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
LED Light Bar Input Current	I_L	120	mA

The measurement methods of optical characteristics are shown in Section 5.2. The following items should be measured under the test conditions described in Section 5.1 and stable environment shown in Note (5).

5.2 OPTICAL SPECIFICATIONS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	θ_x=0°, θ_Y =0° Viewing Normal Angle	300	500	-	-	(2), (5) (8)
Response Time		T_R		-	8	12	ms	(3),(8)
		T_F		-	8	13	ms	
Average Luminance of White		L_{AVE}		170	200	-	cd/m^2	(4), (6) (8)
Color Chromaticity	Red	Rx		Typ – 0.03	0.595	Typ + 0.03	-	(1),(5), (8)
		Ry			0.345		-	
	Green	Gx			0.320		-	
		Gy			0.565		-	
	Blue	Bx			0.155		-	
		By			0.130		-	
	White	Wx			0.313		-	
		Wy			0.329		-	
	Color Gamut	C.G.		42	45	-		(5),(7), (8)
Viewing Angle	Horizontal	θ_x+	CR≥10	40	45		Deg.	(1),(5) (8)
		θ_x-		40	45	-		
	Vertical	θ_Y+		15	20	-		
		θ_Y-		40	45	-		
White Variation of 5 and 13 Points		δW_{5p}	θ_x=0°, θ_Y =0°	80	-	-	%	(5),(6) (8)
		δW_{13p}	θ_x=0°, θ_Y =0°	65	-	-	%	

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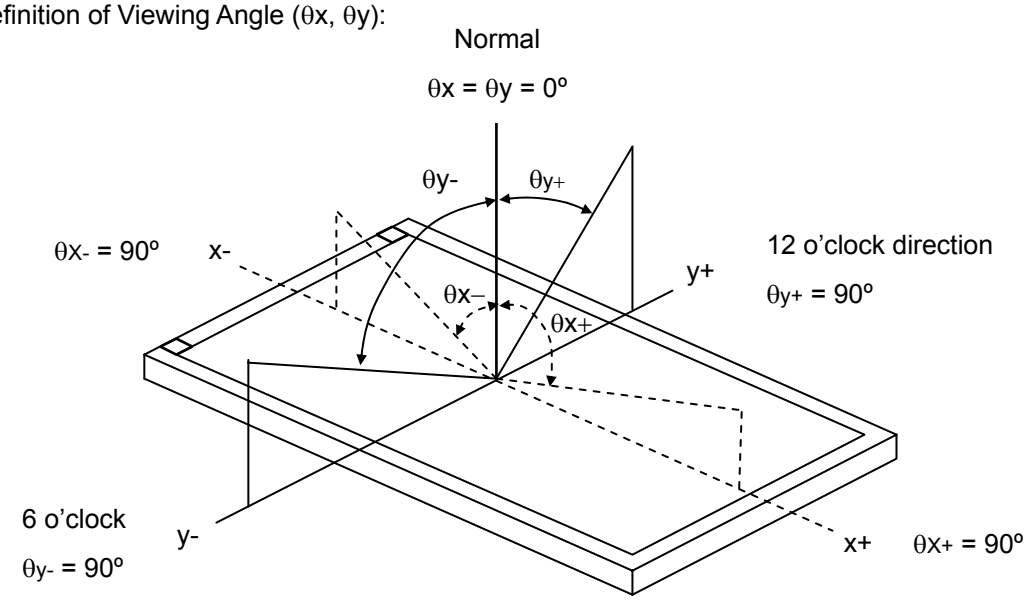
Note (1) Definition of Viewing Angle (θx, θy):



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L63 / L0

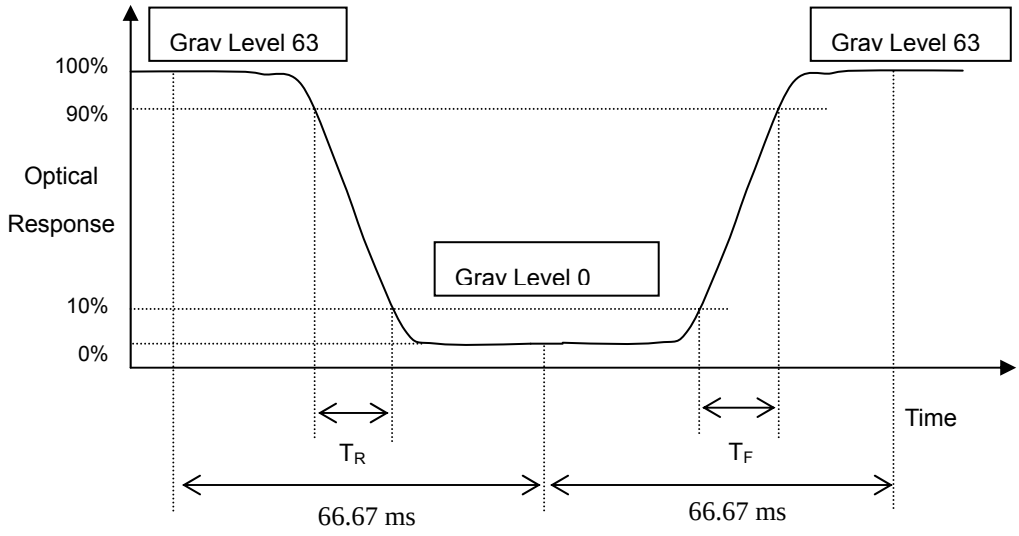
L63: Luminance of gray level 63

L 0: Luminance of gray level 0

CR = CR (1)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

Note (3) Definition of Response Time (T_R, T_F):



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Note (4) Definition of Average Luminance of White (L_{AVE}):

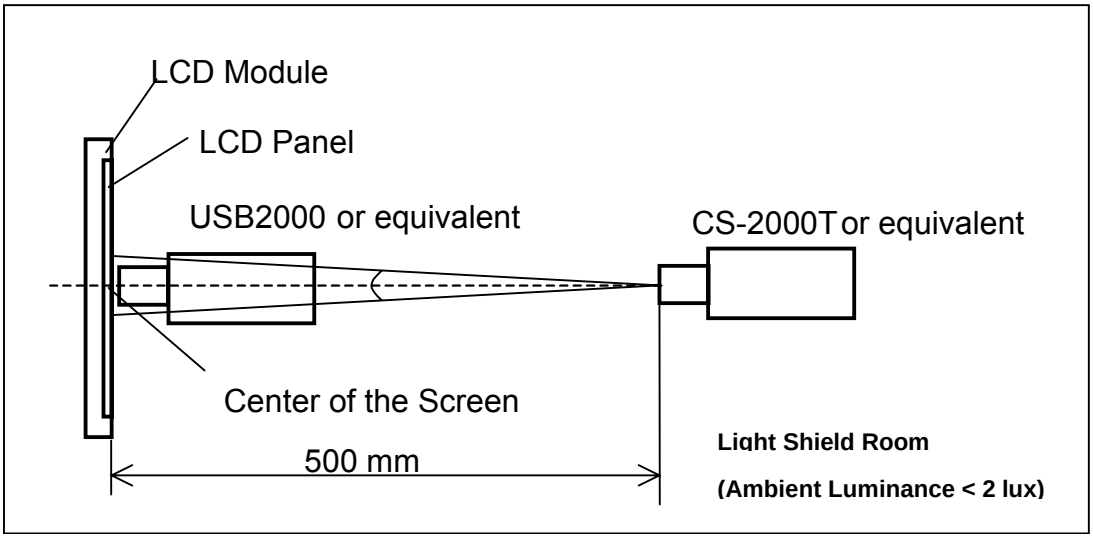
Measure the luminance of gray level 63 at 5 points

L_{AVE} = [L (1)+ L (2)+ L (3)+ L (4)+ L (5)] / 5

L (x) is corresponding to the luminance of the point X at Figure in Note (6)

Note (5) Measurement Setup:

The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



Note (6) Definition of White Variation (δW):

Measure the luminance of gray level 63 at 5 points

δW_{5p} = {Minimum [L (1) ~ L (5)] / Maximum [L (1) ~ L (5)]}*100%

δW_{13p} = {Minimum [L (1) ~ L (13)] / Maximum [L (1) ~ L (13)]}*100%

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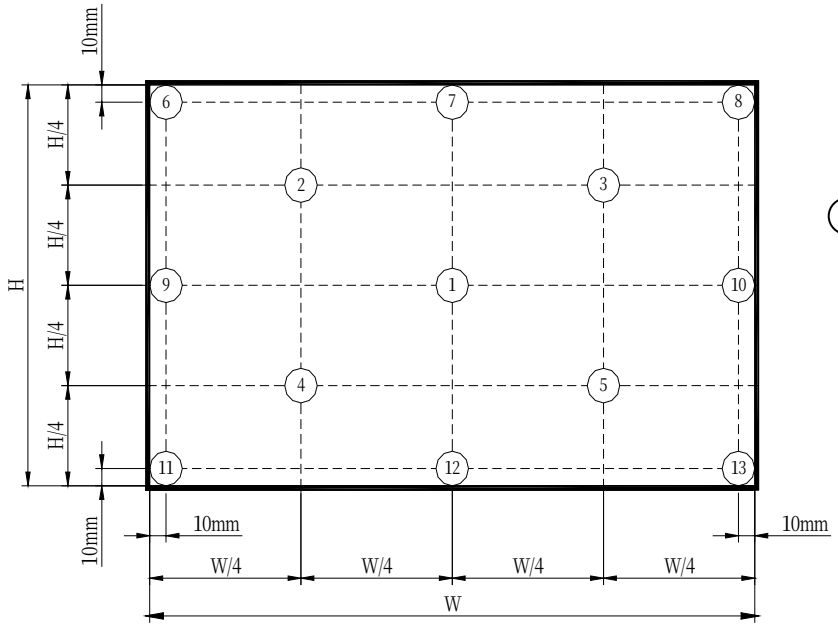


Ⓧ : Test Point

X=1 to 13

Note (7) Definition of color gamut (C.G%):

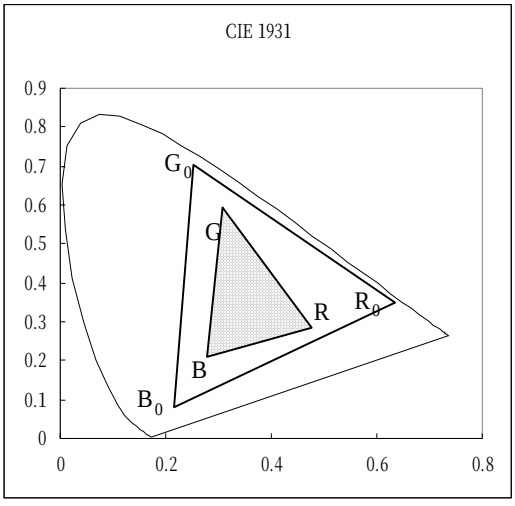
C.G%= R G B / R_0 G_0 B_0,*100%

R_0, G_0, B_0 : color coordinates of red, green, and blue defined by NTSC, respectively.

R, G, B : color coordinates of module on 63 gray levels of red, green, and blue, respectively.

R_0 G_0 B_0 : area of triangle defined by R_0, G_0, B_0

- R G B: area of triangle defined by R, G, B



Note (8) The listed optical specifications refer to the initial value of manufacture, but the condition of the specifications after long-term operation will not be warranted.

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6. RELIABILITY TEST ITEM

Test Item	Test Condition	Note
High Temperature Storage Test	60ºC, 240 hours	(1) (2)
Low Temperature Storage Test	-20ºC, 240 hours	
Thermal Shock Storage Test	-20ºC, 0.5hour←→60℃, 0.5hour; 100cycles, 1hour/cycle	
High Temperature Operation Test	50ºC, 240 hours	
Low Temperature Operation Test	0ºC, 240 hours	
High Temperature & High Humidity Operation Test	50ºC, RH 80%, 240hours	
ESD Test (Operation)	150pF, 330Ω, 1sec/cycle Condition 1 : Contact Discharge, ±8KV Condition 2 : Air Discharge, ±15KV	(1)
Shock (Non-Operating)	220G, 2ms, half sine wave,1 time for each direction of ±X,±Y,±Z	(1)(3)
Vibration (Non-Operating)	1.5G / 10-500 Hz, Sine wave, 30 min/cycle, 1cycle for each X, Y, Z	(1)(3)

Note (1) criteria : Normal display image with no obvious non-uniformity and no line defect.

Note (2) Evaluation should be tested after storage at room temperature for more than two hour

Note (3) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

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7. PACKING

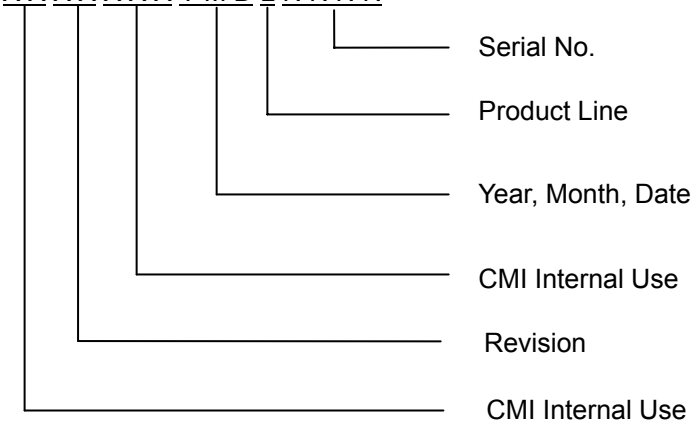
7.1 MODULE LABEL

The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.

(a) Model Name: N133BGE – LA1

(b) Revision: Rev. XX, for example: C1, C2 …etc.

(c) Serial ID: X X X X X X Y M D L N N N N



Serial ID includes the information as below:

(a) Manufactured Date: Year: 0~9, for 2010~2019

Month: 1~9, A~C, for Jan. ~ Dec.

Day: 1~9, A~Y, for 1st to 31st, exclude I , O and U

(b) Revision Code: cover all the change

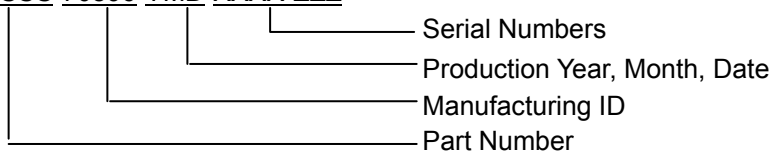
(c) Serial No.: Manufacturing sequence of product

(d) Product Line: 1 -> Line1, 2 -> Line 2, …etc.

(e) UL Logo : XXXX is UL factory ID.

(f) Dell 2D label contains information as below:

(f-1) Serial ID: CN-0SSSSS-70896-YMD-XXXX-ZZZ



(f-2) Production location: Made in XXXX.

(f-3) ZZZ :Revision code: X00, X10, X20, A00..etc.

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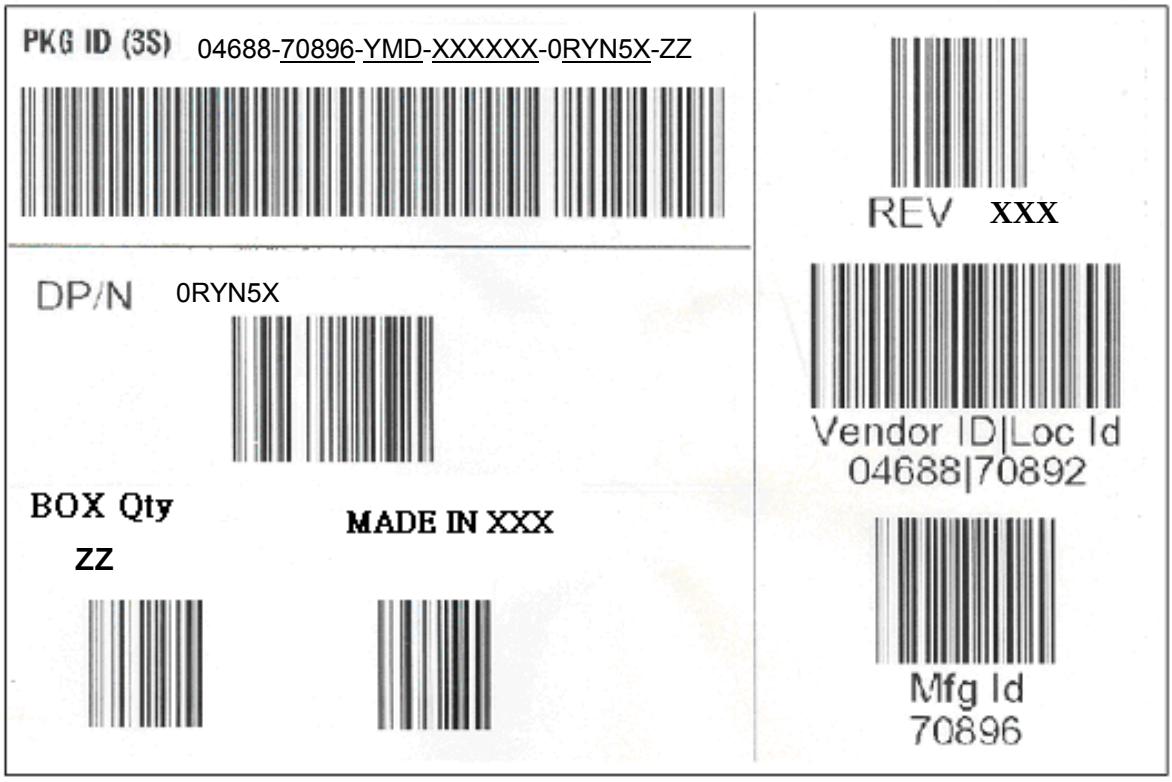
BUILD PHASE	REVISION
SST (WS)	X00, X01, X02, … X09
PT (ES)	X10, X11, X12, … X19
ST (CS)	X20, X21, X23, … X29
XB (MP)	A00, A01, A02, … A99

DELL Carton LABEL

Dell carton label contains information as below:



(a) PKG ID: 04688-70896-YMD-XXXXXX-0SSSSS-ZZ

- Dell P/N
- Serial numbers.
- Production Year, Month, Date
- Manufacturing ID

(b) Production location: Made in XXXX.

(c) Revision code: X00, X10, X20, A00..etc.

(d) BOX Quantity :ZZ

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7.2 CARTON

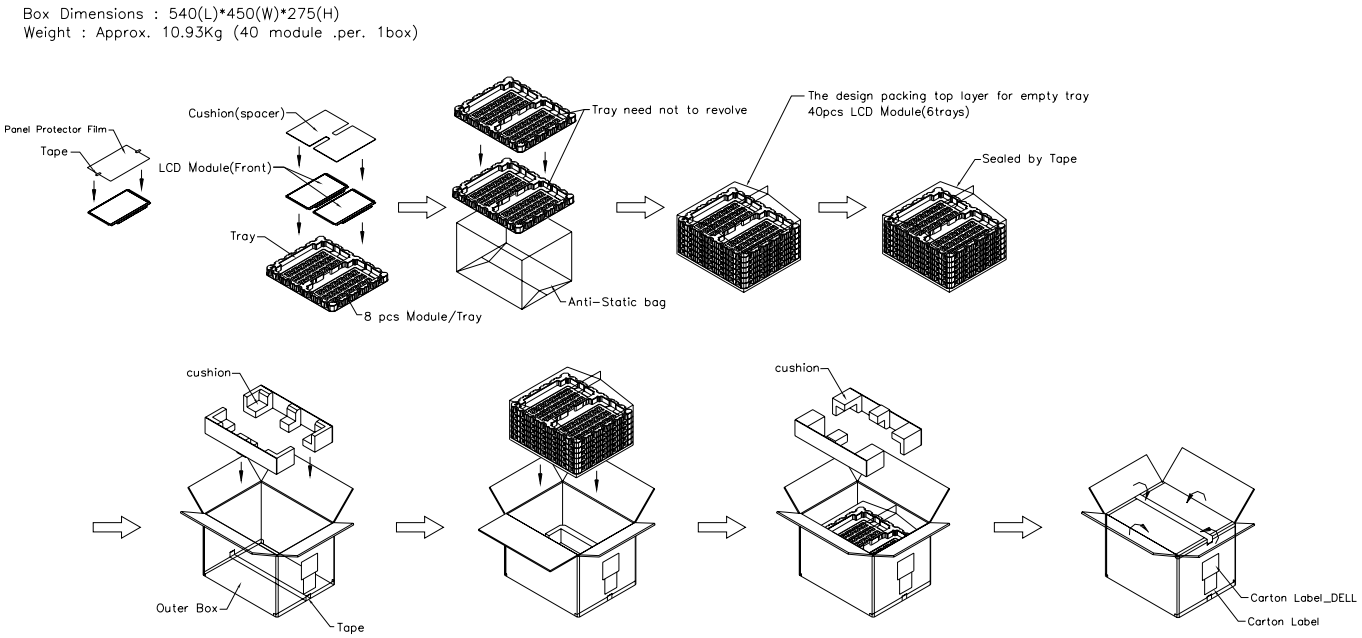

Figure. 7-2 Packing

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7.3 PALLET

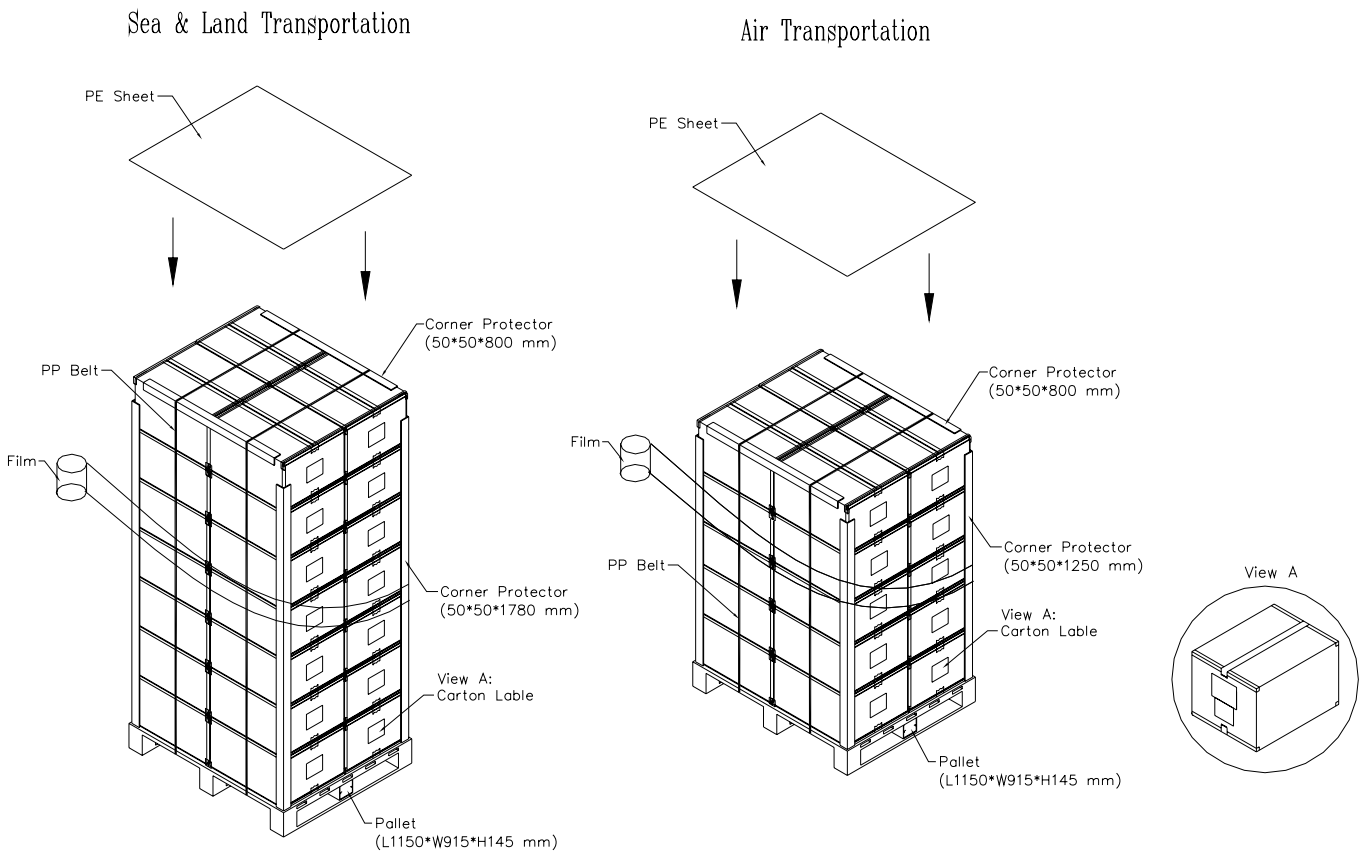

Figure. 7-3 Packing

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8. PRECAUTIONS

8.1 HANDLING PRECAUTIONS

(1) The module should be assembled into the system firmly by using every mounting hole. Be careful not to twist or bend the module.

(2) While assembling or installing modules, it can only be in the clean area. The dust and oil may cause electrical short or damage the polarizer.

(3) Use fingerstalls or soft gloves in order to keep display clean during the incoming inspection and assembly process.

(4) Do not press or scratch the surface harder than a HB pencil lead on the panel because the polarizer is very soft and easily scratched.

(5) If the surface of the polarizer is dirty, please clean it by some absorbent cotton or soft cloth. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage the polarizer due to chemical reaction.

(6) Wipe off water droplets or oil immediately. Staining and discoloration may occur if they left on panel for a long time.

(7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contacting with hands, legs or clothes, it must be washed away thoroughly with soap.

(8) Protect the module from static electricity, it may cause damage to the C-MOS Gate Array IC.

(9) Do not disassemble the module.

(10) Do not pull or fold the LED wire.

(11) Pins of I/F connector should not be touched directly with bare hands.

8.2 STORAGE PRECAUTIONS

(1) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.

(2) It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.

(3) It may reduce the display quality if the ambient temperature is lower than 10 ºC. For example, the response time will become slowly, and the starting voltage of LED will be higher than the room temperature.

8.3 OPERATION PRECAUTIONS

(1) Do not pull the I/F connector in or out while the module is operating.

(2) Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.

(3) The startup voltage of Backlight is approximately 1000 Volts. It may cause electrical shock while assembling with converter. Do not disassemble the module or insert anything into the Backlight unit.

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Appendix. EDID DATA STRUCTURE

The EDID (Extended Display Identification Data) data formats are to support displays as defined in the VESA Plug & Display and FPDI standards.

Byte # (decimal)	Byte # (hex)	Field Name and Comments	Value (hex)	Value (binary)
0	0	Header , Fixed	00	00000000
1	1	Header , Fixed	FF	11111111
2	2	Header , Fixed	FF	11111111
3	3	Header , Fixed	FF	11111111
4	4	Header , Fixed	FF	11111111
5	5	Header , Fixed	FF	11111111
6	6	Header , Fixed	FF	11111111
7	7	Header , Fixed	00	00000000
8	8	ID system manufacturer name	0D	00001101
9	9	ID system manufacturer name	AE	10101110
10	0A	ID system Product Code (LSB)	44	01000100
11	0B	ID system Product Code (MSB)	13	00010011
12	0C	32-bit serial # Unused(01h for VESA, 00h for SPWG)	00	00000000
13	0D	32-bit serial # Unused(01h for VESA, 00h for SPWG)	00	00000000
14	0E	32-bit serial # Unused(01h for VESA, 00h for SPWG)	00	00000000
15	0F	32-bit serial # Unused(01h for VESA, 00h for SPWG)	00	00000000
16	10	Week of manufacture 1 - 53 (unused: 00h)	6	00000110
17	11	Year of manufacture year - 1990(unsed:00h)	16	00010110
18	12	Version=1	01	00000001
19	13	Revision=4	04	00000100
20	14	Vedio Input Definition	90	10010000
21	15	Active area horizontal 29.341cm	1D	00011101
22	16	Active area vertical 16.496cm	10	00010000
23	17	Display Gamma (Gamma = ”2.2”)	78	01111000
24	18	Feature support	02	00000010
25	19	Rx1, Rx0, Ry1, Ry0, Gx1, Gx0, Gy1, Gy0	53	01010011
26	1A	Bx1, Bx0, By1, By0, Wx1, Wx0, Wy1, Wy0	D5	11010101
27	1B	Rx=0.595	98	10011000
28	1C	Ry=0.345	58	01011000
29	1D	Gx=0.32	52	01010010
30	1E	Gy=0.565	90	10010000
31	1F	Bx=0.155	27	00100111
32	20	By=0.13	21	00100001
33	21	Wx=0.313	50	01010000
34	22	Wy=0.329	54	01010100
35	23	Established timings 1	00	00000000
36	24	Established timings 2 (1366x768@60Hz)	00	00000000
37	25	No manufacturer's specific timing	00	00000000
38	26	Standard timing ID # 1	01	00000001
39	27	Standard timing ID # 1	01	00000001
40	28	Standard timing ID # 2	01	00000001
41	29	Standard timing ID # 2	01	00000001

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42	2A	Standard timing ID # 3	01	00000001
43	2B	Standard timing ID # 3	01	00000001
44	2C	Standard timing ID # 4	01	00000001
45	2D	Standard timing ID # 4	01	00000001
46	2E	Standard timing ID # 5	01	00000001
47	2F	Standard timing ID # 5	01	00000001
48	30	Standard timing ID # 6	01	00000001
49	31	Standard timing ID # 6	01	00000001
50	32	Standard timing ID # 7	01	00000001
51	33	Standard timing ID # 7	01	00000001
52	34	Standard timing ID # 8	01	00000001
53	35	Standard timing ID # 8	01	00000001
54	36	Detailed timing description # 1 Pixel clock (“76.4MHz”, According to VESA CVT Rev1.4)	D8	11011000
55	37	# 1 76.4MHz/10000 =7640=D81D(Hex)	1D	00011101
56	38	# 1 H active (“1366”)	56	01010110
57	39	# 1 H blank (“225”)	E1	11100001
58	3A	# 1 H active : H blank (“1366 : 225”)	50	01010000
59	3B	# 1 V active (”768”)	00	00000000
60	3C	# 1 V blank (”32”)	20	00100000
61	3D	# 1 V active : V blank (”768 :32”)	30	00110000
62	3E	# 1 H sync offset (”68”)	44	01000100
63	3F	# 1 H sync pulse width ("45”)	2D	00101101
64	40	# 1 V sync offset : V sync pulse width (”4 : 7”)	47	01000111
65	41	# 1 H sync offset : H sync pulse width : V sync offset : V sync width (”68: 45 : 4 : 7”)	00	00000000
66	42	# 1 H image size (”293 mm”)	25	00100101
67	43	# 1 V image size (”164 mm”)	A4	10100100
68	44	# 1 H image size : V image size ("293 : 164”)	10	00010000
69	45	# 1 H boarder (”0”)	00	00000000
70	46	# 1 V boarder (”0”)	00	00000000
71	47	Non-interlaced, Normal Display, Digital separate, Positive Hsync, Negative Vsync	1A	00011010
72	48	Detailed timing description # 1 Pixel clock (“50.95MHz”, According to VESA CVT Rev1.4)	E7	11100111
73	49	# 2 50.95MHz/10000 =5095=E713(Hex)	13	00010011
74	4A	# 2 H active (“1366”)	56	01010110
75	4B	# 2 H blank (“225”)	E1	11100001
76	4C	# 2 H active : H blank (“1366 : 225”)	50	01010000
77	4D	# 2 V active (”768”)	00	00000000
78	4E	# 2 V blank (”32”)	20	00100000
79	4F	# 2 V active : V blank (”768 :32”)	30	00110000
80	50	# 2 H sync offset (”68”)	44	01000100
81	51	# 2 H sync pulse width ("45”)	2D	00101101
82	52	# 2 V sync offset : V sync pulse width (”4 : 7”)	47	01000111
83	53	# 2 H sync offset : H sync pulse width : V sync offset : V sync width (”68: 45 : 4 : 7”)	00	00000000
84	54	# 2 H image size (”293 mm”)	25	00100101
85	55	# 2 V image size (”164 mm”)	A4	10100100

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86	56	# 2 H image size : V image size (”293 : 164”)	10	00010000
87	57	# 2 H boarder (”0”)	00	00000000
88	58	# 2 V boarder (”0”)	00	00000000
89	59	Non-interlaced, Normal Display, Digital separate, Positive Hsync, Negative Vsync	1A	00011010
90	5A	Flag	00	00000000
91	5B	Flag	00	00000000
92	5C	Flag	00	00000000
93	5D	Data Type Tag: Alphanumeric Data String (ASCII)	FE	11111110
94	5E	Flag	00	00000000
95	5F	Dell P/N 1st Character "R"	52	01010010
96	60	Dell P/N 2nd Character "Y"	59	01011001
97	61	Dell P/N 3rd Character "N"	4E	01001110
98	62	Dell P/N 4th Character "5"	35	00110101
99	63	Dell P/N 5th Character "X"	58	01011000
100	64	EDID Revision	01	00000001
101	65	Manufacturer P/N "1"	31	00110001
102	66	Manufacturer P/N "3"	33	00110011
103	67	Manufacturer P/N "3"	33	00110011
104	68	Manufacturer P/N "B"	42	01000010
105	69	Manufacturer P/N "G"	47	01000111
106	6A	Manufacturer P/N "E"	45	01000101
107	6B	Manufacturer P/N (If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	0A	00001010
108	6C	Flag	00	00000000
109	6D	Flag	00	00000000
110	6E	Flag	00	00000000
111	6F	Data Type Tag: Manufacturer Specified Data 00	00	00000000
112	70	Flag	00	00000000
113	71	Color Management	00	00000000
114	72	Panel Type and Revision	41	01000001
115	73	Frame Rate	31	00110001
116	74	Light Controller Interface and Maximum Luminance	96	10010110
117	75	Front Surface / Polarizer and Pixel Structure	00	00000000
118	76	Multi-Media Features	10	00010000
119	77	Multi-Media Features	00	00000000
120	78	Special Features	00	00000000
121	79	Special Feature	01	00000001
122	7A	Special Features	01	00000001
123	7B	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	0A	00001010
124	7C	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	20	00100000
125	7D	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	20	00100000
126	7E	No extension	00	00000000
127	7F	Checksum	5B	01011011

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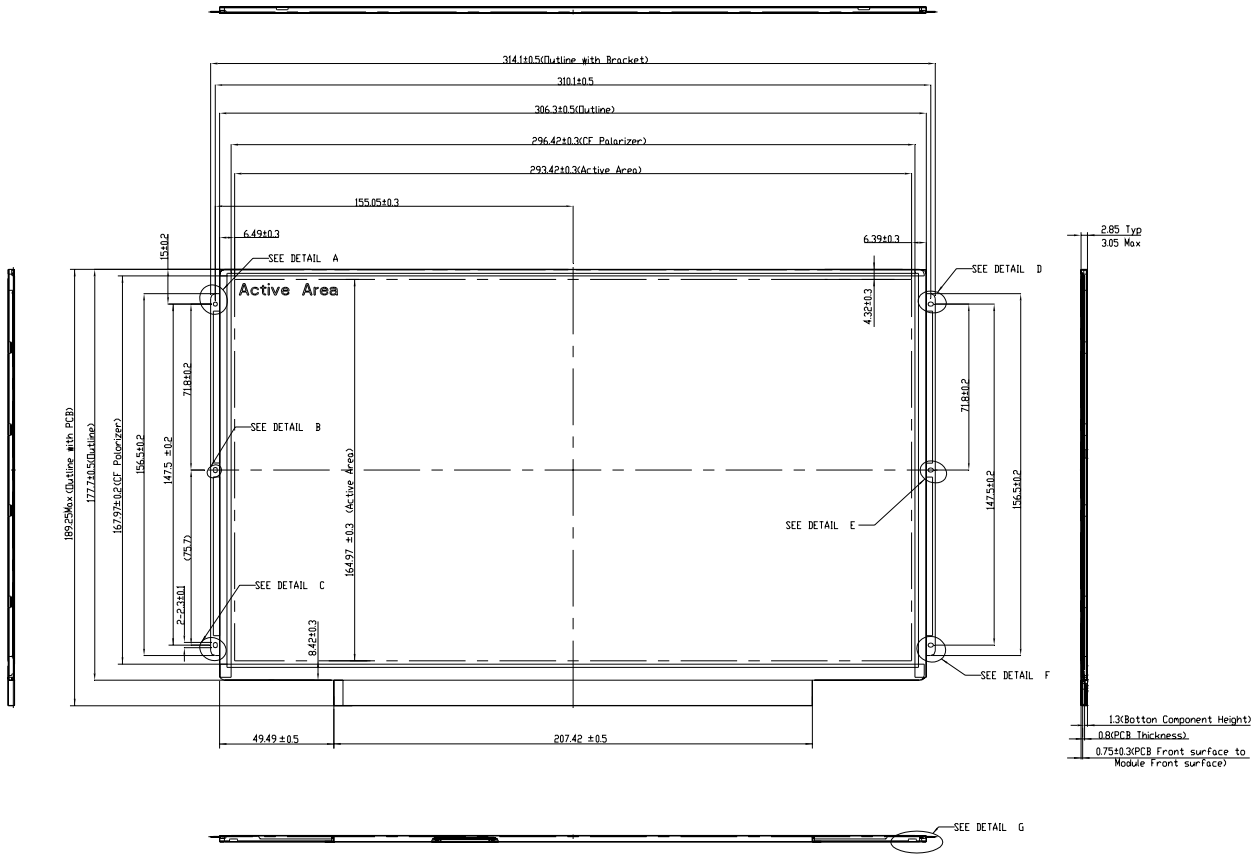
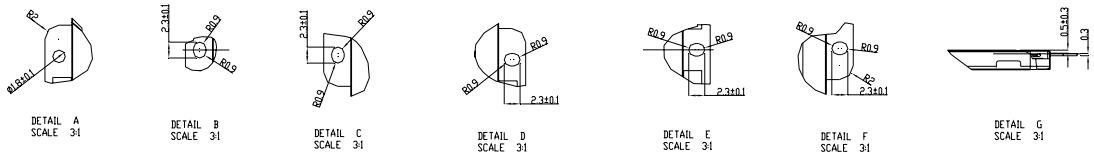
Appendix. OUTLINE DRAWING





NOTES :
1. LCD MODULE INPUT CONNECTOR : I-PEX 20455-040E-12 OR EQUIVALENT.
2. IN ORDER TO AVOID ABNORMAL DISPLAY, POOLING AND WHITE SPOT,
   NO OVERLAPPING IS SUGGESTED AT CABLES, ANTENNAS, CAMERA, WLAN, WAN OR
   FOREIGN OBJECTS OVER FPC, T-CON AND VR LOCATIONS.
3. LVDS CONNECTOR IS MEASURED AT PIN1 AND ITS MATING LINE.
4. MODULE FLATNESS SPEC 0.5mm MAX.
5. "( )" MARKS THE REFERENCE DIMENSIONS.

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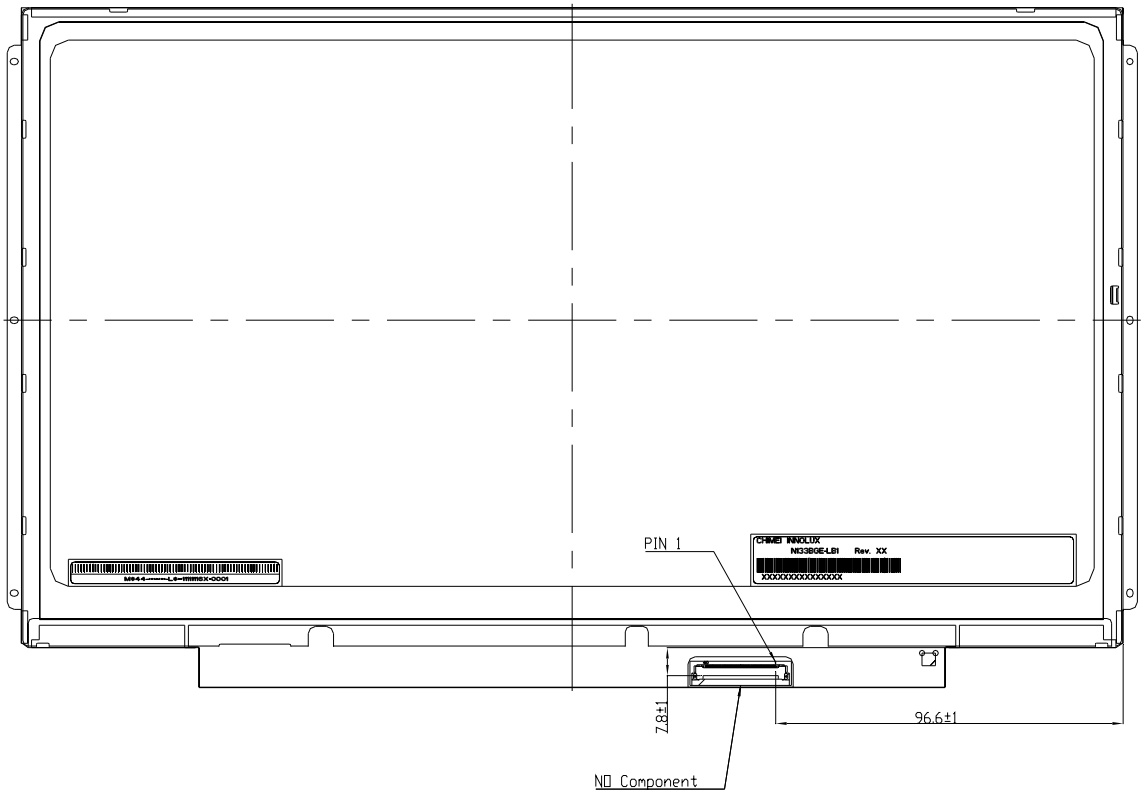

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